

WHAT IS CLAIMED IS:

1. A corrosion and erosion resistant alloy comprising, in % by weight:

from about 31 to about 48 chromium
from about 0.01 to about 0.7 nitrogen
from about 0.5 to about 30 manganese
from about 0.3 to about 2.5 carbon
from 0 to about 5 boron
from 0 to about 6 molybdenum
from 0 to about 5 silicon
from 0 to about 8 copper
from 0 to about 4 cobalt
from 0 to about 25 nickel plus cobalt,

said alloy further comprising from 0 to about 2 % of each of zirconium, vanadium, cerium, titanium, tantalum, tungsten, niobium, aluminum, calcium and rare earth elements, the balance comprising iron and inevitable impurities, said alloy having a microstructure comprising chromium carbides, nitrides and optionally borides in an austenitic matrix, said matrix having a face centered cubic crystal structure and being supersaturated with nitrogen in solid solution form, the composition of the alloy satisfying the relationship:

$$\frac{\% Ni + \% Co + 0.5(\% Mn + \% Cu) + 30(\% N + \% C) + 5x\% B}{\% Cr + \% Mo + \% Si + 1.5(\% Ti + \% Ta + \% V + \% Nb + \% Ce + \% Al)} \geq 1.5 .$$

2. The alloy of claim 1, wherein the alloy comprises of at least one of molybdenum, silicon, boron, copper and (nickel plus cobalt), each in an amount of at least about 0.01 % by weight.
3. The alloy of claim 1, wherein the alloy comprises at least about 32 % by weight of chromium.
4. The alloy of claim 3, wherein the alloy comprises of at least one of molybdenum,

silicon, boron, copper and (nickel plus cobalt), each in an amount of at least about 0.01 % by weight.

5. A corrosion and erosion resistant alloy comprising, in % by weight:

- from about 32 to about 34 chromium
- from about 0.35 to about 0.45 nitrogen
- from about 6 to about 9 manganese
- from about 0.5 to about 2.5 carbon
- from 0 to about 4.5 boron
- from 0 to about 5 molybdenum
- from 0 to about 3 silicon
- from 0 to about 4 copper
- from 0 to about 4 cobalt
- from 0 to about 4 nickel plus cobalt,

said alloy further comprising 0 to about 2 % of each of zirconium, vanadium, cerium, titanium, tantalum, tungsten, niobium, aluminum, calcium and rare earth elements, the balance comprising iron and inevitable impurities, said alloy having a microstructure comprising chromium carbides, nitrides and optionally borides in an austenitic matrix, said matrix having a face centered cubic crystal structure and being supersaturated with nitrogen in solid solution form, the composition of the alloy satisfying the relationship:

$$\frac{\% Ni + \% Co + 0.5(\% Mn + \% Cu) + 30(\% N + \% C) + 5x\% B}{\% Cr + \% Mo + \% Si + 1.5(\% Ti + \% Ta + \% V + \% Nb + \% Ce + \% Al)} \geq 1.5 .$$

6. The alloy of claim 5, wherein the alloy comprises, in % by weight, one or more of the following:

- from about 2 to about 5 molybdenum
- from about 0.5 to about 3 silicon
- from about 0.7 to about 4 copper
- from about 1.5 to about 4 nickel plus cobalt.

7. The alloy of claim 6, wherein the alloy comprises, in % by weight:
 - from about 2 to about 4 molybdenum
 - from about 0.5 to about 2 silicon
 - from about 0.7 to about 3 copper
 - from about 1.5 to about 3 nickel plus cobalt.
8. The alloy of claim 6, wherein the alloy comprises at least about 0.01 % by weight of boron.
9. A corrosion and erosion resistant alloy comprising, in % by weight:
 - from about 35 to about 40 chromium
 - from about 0.4 to about 0.6 nitrogen
 - from about 4.5 to about 15 manganese
 - from about 0.8 to about 1.6 carbon
 - from 0 to about 5 boron
 - from 0 to about 5 molybdenum
 - from 0 to about 3 silicon
 - from 0 to about 6 copper
 - from 0 to about 4 cobalt
 - from 0 to about 13 nickel plus cobalt,
 said alloy further comprising from 0 to about 2 % of each of zirconium, vanadium, cerium, titanium, tantalum, tungsten, niobium, aluminum, calcium and rare earth elements, the balance comprising iron and inevitable impurities, said alloy having a microstructure comprising chromium carbides, nitrides and optionally borides in an austenitic matrix, said matrix having a face centered cubic crystal structure and being supersaturated with nitrogen in solid solution form, the composition of the alloy satisfying the relationship:

$$\frac{\% Ni + \% Co + 0.5(\% Mn + \% Cu) + 30(\% N + \% C) + 5x\% B}{\% Cr + \% Mo + \% Si + 1.5(\% Ti + \% Ta + \% V + \% Nb + \% Ce + \% Al)} \geq 1.5 .$$

10. The alloy of claim 9, wherein the alloy comprises, in % by weight, one or more of the following:

- from about 2 to about 4 molybdenum
- from about 0.5 to about 2 silicon
- from about 1 to about 4 copper
- from about 4 to about 13 nickel plus cobalt.

11. The alloy of claim 9, wherein the alloy comprises, in % by weight:

- from about 0.9 to about 1.6 carbon
- from about 5 to about 13 manganese
- from about 2 to about 4 molybdenum
- from 0 to about 4.5 boron
- from about 0.5 to about 1.5 silicon
- from about 1 to about 3 copper
- from about 0.01 to about 4 cobalt
- from about 4 to about 12.5 nickel plus cobalt.

12. The alloy of claim 10, wherein the alloy comprises, in % by weight:

- from about 1 to about 1.55 carbon
- from about 5 to about 12 manganese
- from about 2 to about 3.5 molybdenum
- from 0 to about 4 boron
- from about 0.6 to about 1.2 silicon
- from about 1 to about 2.5 copper
- from about 0.02 to about 4 cobalt
- from about 4 to about 12 nickel plus cobalt.

13. The alloy of claim 1, which exhibits a PREN of from 58 to 66.

14. The alloy of claim 11, which exhibits a PREN of from 58 to 66.

15. The alloy of claim 13, wherein the matrix comprises from about 0.25 % to about 0.45 % by weight of nitrogen in solid solution form.

16. The alloy of claim 1, wherein the alloy comprises, in % by weight:

from about 41 to about 48 chromium

from about 0.45 to about 0.7 nitrogen

from about 6 to about 30 manganese

from about 0.9 to about 1.5 carbon

from 0 to about 3.5 boron

from 0 to about 4 molybdenum

from 0 to about 3 silicon

from 0 to about 8 copper

from 0 to about 25 nickel plus cobalt,

the balance comprising iron and inevitable impurities.

17. The alloy of claim 16, wherein the alloy comprises of at least one of molybdenum, silicon, boron, copper and (nickel plus cobalt), each in an amount of at least about 0.01 % by weight.

18. The alloy of claim 17, wherein the alloy comprises, in % by weight, one or more of the following:

from about 1 to about 4 molybdenum

from about 0.5 to about 3 silicon

from about 1 to about 8 copper

from about 10 to about 25 nickel plus cobalt.

19. The alloy of claim 18, wherein a PREN is from 51 to 72.

20. The alloy of claim 16, wherein the matrix comprises from about 0.25 % to about 0.45 % by weight of nitrogen in solid solution form.

21. A casting which comprises the alloy of claim 1.
22. A casting which comprises the alloy of claim 12.
23. A part of a slurry pump which comprises the alloy of claim 1.
24. The part of claim 23, wherein the part comprises one of a casing, impeller, suction liner, pipe, nozzle, agitator and a valve blade.